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The National Tool and Die Journal

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OCTOBER 1940

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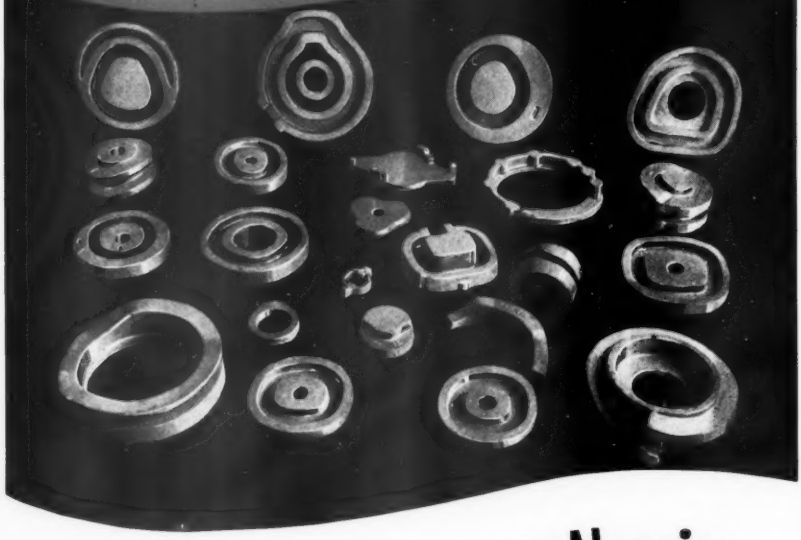

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Circulated monthly to executives and department heads responsible for designing, building and using Precision Tooling.

Engineers, Designers, Estimators, Tool and Die Makers may subscribe for one dollar annually.

Editor George J. Huebner

Assistant Editor Paul L. Reed

Official Organ of the Special Tool, Die and Machine Shop Institute

Vol. 6 | OCTOBER, 1940 | No. 7

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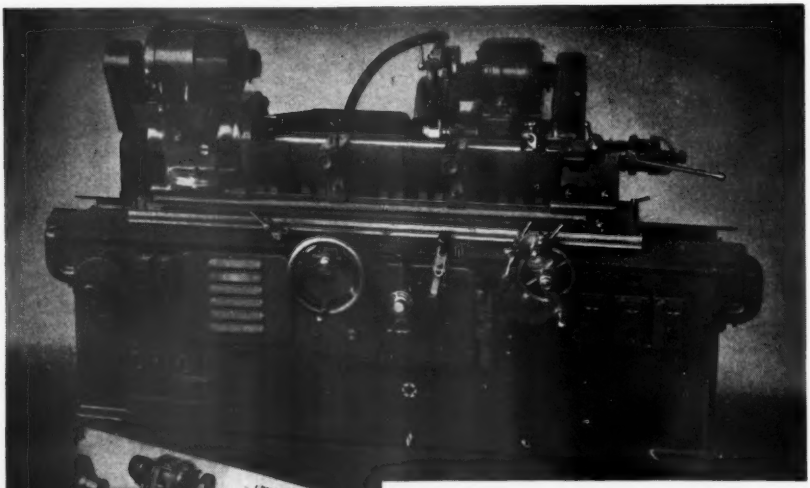

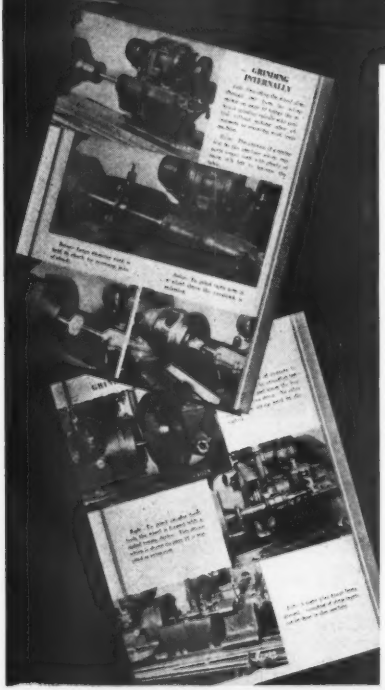

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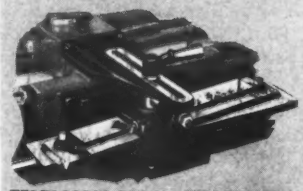

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Severance
MIDGET MILLING CUTTERS

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SUBJECT: 50% + 100% + 400% = Savings worth while.

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Cut 50% faster...Do you know that TWO men can easily do the work of THREE when you give them GROUND CUTTERS to replace hand cut or mill cut rotary files?

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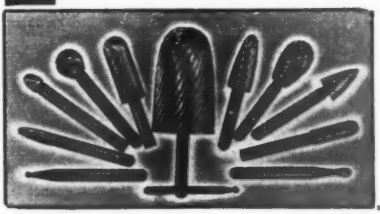

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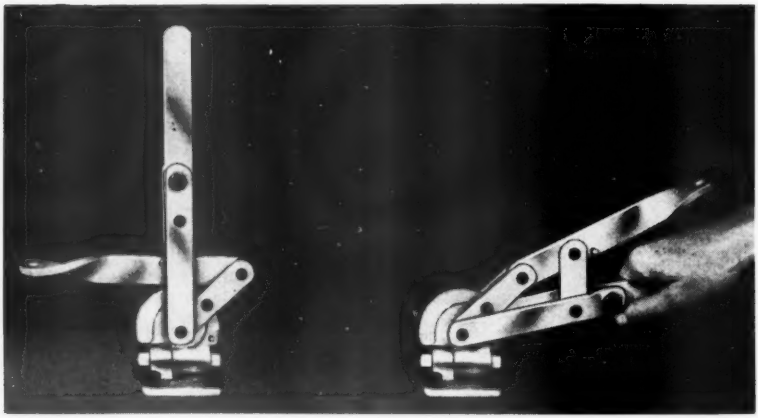

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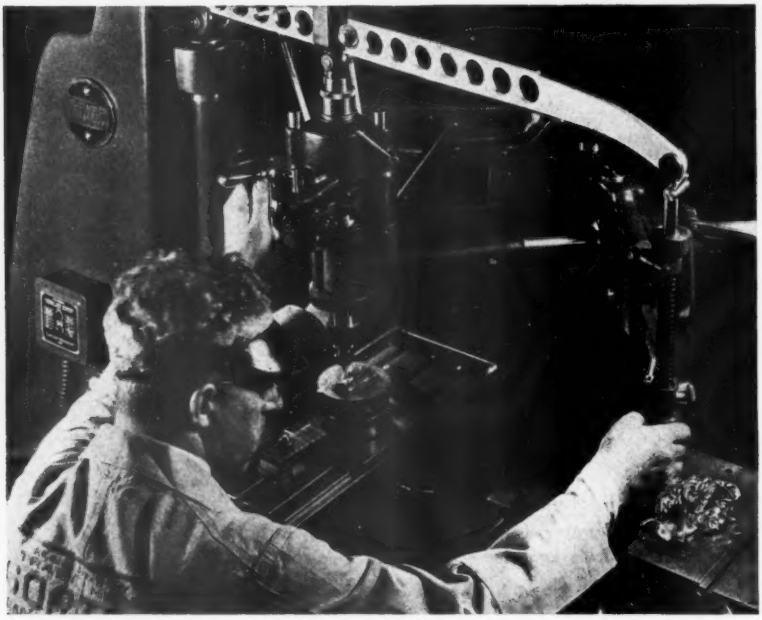
GORTON 3-L PANTOGRAPH



★ The Gorton 3-Dimensional Pantograph reproduces from enlarged models and masters in either 2 or 3 dimensions. In addition to being used for modelling work, the 3-L can be used for all types of work ordinarily done on 2-dimensional machines, including machine engraving and profiling. Available in two sizes.

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TOOL · DIE · MACHINE PROGRESS
The National Tool and Die Journal
OCTOBER, 1940 Vol. 6, No. 7

Streamlining Die Design to Increase Production

by

GLENN A. BARTH

Barth Stamping & Machine Works

DIE designing, like all other factors that enter into modern production methods, has been subject to considerable pressure in the past few years, particularly the past year or two. As a result there has been a definite streamlining of die construction to meet the newest and most stringent requirements of high production manufacturers.

For example, large stampings are now being produced in the most economical manner by streamlined production methods which leave little to be desired from the standpoint of the actual time required to convert the finished product from the raw material. Naturally, die design has had to not only keep abreast, but a step ahead, of modern production practice. The ingenuity of the die designer helps set the entire manufacturing pace. In turn, the influence of the assembly production line has been felt by the die designer.

No clearer evidence is seen than the trend in some large production shops to locate or group presses to suit the needs of a particular job. The presses no longer remain in their old established positions but are arranged in a square, circle or irregular pattern to do a job most efficiently. For the next job the press grouping may be entirely different. This grouping is accomplished by large cranes which can relocate the presses almost as readily as the die setter removes and sets up the dies for a new part.

A group of dies for the production of fairly large size pan shaped stampings will illustrate the tendency toward streamlining die design to meet modern production demands. A notch and draw die replaces two dies which performed these operations separately. The trimming and horn piercing dies reduce eight previous operations to two. The fourth die, a collapsible cam-operated underturning die, does in four stations operations that previously were performed in eight stations.

The square shears form an integral part of the grouping. Large draw dies which produce complicated shapes must also include the notching of the corners as an integral part of the die.

The drawn pan shaped stampings are then passed directly into the trimming press by the operators who remove them from the draw press. A single stroke trims the entire flange at right angles to the vertical flanges by the aid of cam actuated slides within the trimming die.

Other operators pass the stampings into a horning press which is now equipped with a die which not only pierces the necessary holes in the main flange with the customary movement of the punches downward into the die but also drives other punches upward at the bottom of the horn to accomplish the piercing which must be done in the bottom flange at the same time.

The stamping, now taken from this operation, passes along a line of operators stationed at a power press brake fitted with a set of horning dies which underturn that portion of the flanges which serve to fasten the finished stamping to its place in the completed product. It is entirely practical to accomplish such underturning in a single operation by the means of collapsible cam-operated dies when the cost is justified by the production requirements. Otherwise these underturning operations will proceed from one operator to another, each turning one of the flanges, all the work being done at the same time in the same machine. To do this it is sometimes necessary for the stamping to pass from station to station at the front of the brake and then return at the back of the same machine.

It is now possible to eliminate the corner flanging as a separate operation with dies that iron the corners at the same time they turn the sides. Otherwise, another horning press operation is necessary.

The specific planning for the production of stampings in this case actually requires that dies be designed and used as assembly line tools. The raw material moves down the line through each of the press operations in turn so that there is no stopping between operations. Such line production requires coordinated planning of the highest order.

The results speak for themselves. The minimizing of handling, the great reduction in scrap, the elimination of storage all combine to increase the efficiency of the operators. The reduction of scrap alone more than compensates for planning time and the rearrangement of presses that may be necessary. Since irregularities or imperfections in stampings are detected immediately in an assembly line type of operation, scrap losses virtually disappear.

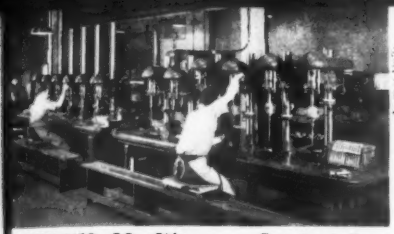
The reduction of storage space requirements is a major factor with large production manufacturers. It often makes possible the installation of additional presses and other equipment, thus increasing manufacturing facilities.

The final finishing, inspection and packing operations move the completed stampings right out of the shop, ready for shipping.

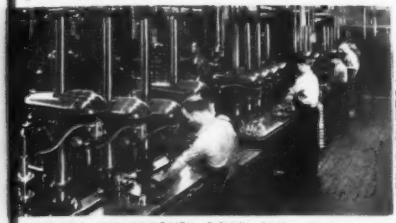
The set of dies described were designed, built, tested and shipped within three months. In production these dies are expected to turn out complete stampings ready for the final assembly line of the manufacturer at a rate of 200 to 400 pieces per hour.

Organizations that can accomplish such results effectively are successfully applying the assembly line principle to both die design and press operations to meet a wide range of production requirements with consequent savings in cost and with assurance of the same uniform quality.

The great and insistent pressure on the production industries to build better products and to build them faster and more economically is unrelenting. The die builder, who is usually the die designer also, now has a greater responsibility than ever before, since not only the product design, but the method of manufacture and even the price structure of the finished article, depends upon the capabilities and the limitations of the dies as assembly line tools. The National Defense Program adds even more emphasis to the demand to "streamline" die design to increase production.



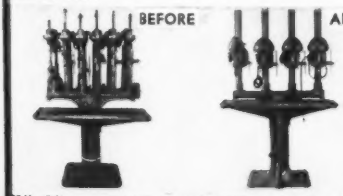
BINKS MFG. CO., Chicago . . . Two 6-spindle units in this plant use the new Delta sectional table, which provides a table of any length and any number of heads—at minimum cost. Rolling seat for operator increases efficiency, speeds production.



KEARNEY AND TRECKER CORP., Milwaukee . . . This 16-spindle Delta set up speeds production of famous milling machines. In addition to drill presses, this plant uses Delta Tool Grinders and cut-off machines.

SCHULTZ DIE CASTING CO., Toledo . . . Two 4 spindle 14" units are used here for drilling, threading, tapping and spot facing. Delta disk and belt sanders, grinders and band saws also play an important part in their production.

ALEMITE DIE CASTINGS & MFG. CO., Woodstock, Ill. . . . . Delta drill presses are used almost exclusively here for drilling and tapping automotive trim parts. Note how one head is inverted which considerably reduced fixture cost.



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Modernize your "cripples" this simple way, by replacing worn out spindles with new, modern Delta drill press heads and columns at remarkably low cost.

BREAK UP THAT BOTTLE NECK!

INCREASE YOUR PRODUCTION
WITH DELTA INDUSTRIAL MACHINE TOOLS

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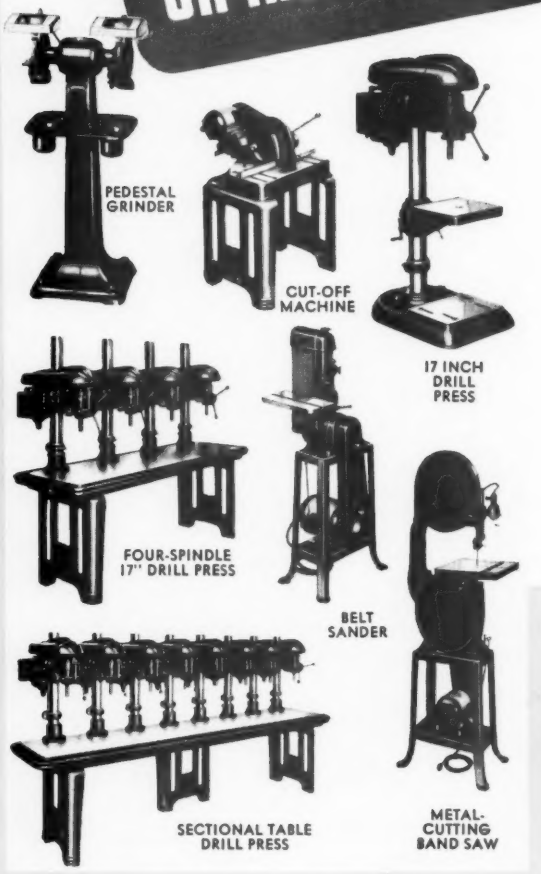

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INDUSTRIAL MACHINE TOOLS

The Design and Construction of Typical Drill Jigs

By E. G. Marshall
Assistant Superintendent
Pittsburgh Screw and Bolt Corp.
Prebble Avenue Plant

With this article we continue the Marshall series of Practical Tool Design and Tool Making. In this and succeeding issues Mr. Marshall discusses the design and construction of representative drill jigs built in the tool room and die shop. In spite of the fact that the past few years have seen a great increase in the use of standardized parts and of standard castings for jig bodies, the individual tastes and preferences of designers and builders remain a very important factor in jig design. The experienced designer will find worthwhile ideas in these articles. The younger shop man particularly those called upon to adapt their knowledge of fundamentals to an increasing variety of jobs, will find this and the succeeding installments of real value.

—The Editor.

BECAUSE the designing and building of drill jigs is so frequently taken for granted, the ingenuity and skill required is sometimes forgotten. The fact that individual designers go about the task of even the simplest drill jig in as many ways as there are designers may be misleading. However, since there are basic types of drill jigs and fundamental problems to be faced in their construction it is possible to understand and follow the principles involved by an examination of a number of typical jigs.

Fig. 13 is a drawing of an economical drill plate. A drill plate of this type is used for small orders and small parts. It is inexpensive to build and yet accurate enough for most work. A is the top plate containing the drill bushings H. The nest plate C is screwed and doweled to the top plate with G and F. The bottom plate B is used only to hold the work in the nest plate and as a sort of removable base. D is a strip spot-welded to the bottom plate to level the plate. This strip is the same thickness as the hinge E. All the locating is done on the plate A so no accuracy is required of the hinge or the bottom plate. I is a pick-out groove in the nest plate to pick out the work when it sticks in the drill plate.

When the plate is large enough to enable the operator to prevent it from spinning by holding it, the handles may be omitted.

If the shop has no jig borer, the holes for the bushings may be laid out by the vernier height method. If the blanks to be drilled were made in the shop, fit the nest plate to one. Otherwise, the nest plate must be laid out, cyanide hardened, and located on the top plate by a plug which fits the hole in the bushing and the radius in the nest plate. Dowel and screw holes can be transferred from the nest plate to the top plate. The jig

is complete with the spotwelding of the hinges to the top and bottom plates.

be drawn in. The diameter of the largest, pin C, should be given; the dimension

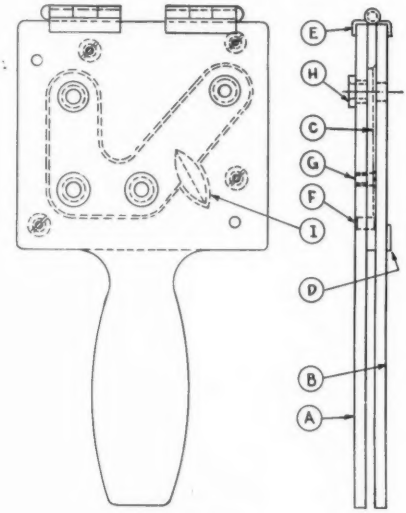


Fig. 13

In adding machines, cash registers and similar products there are a number of jobs of assembling hubs to flat plate cams. The hub is riveted on and to prevent turning in use, small dowels are driven in. A blind hole is drilled through the cam and part way through the hub. They are centered on the diameter of the hub in the cam. This leaves half the dowel in each part. The work is done on a sensitive drill press. A in Fig. 14 illustrates the work on a single operation jig. B is the body of the jig, usually made of cold rolled steel. C is the locating pin which fits the hole in the part. The work is held from rotating on this pin by two small pins D. The plate and the work are held flat on the table by the two feet E and the pressure of the hand. While this is not a design especially adapted for accurate drilling it is practical for drilling for stake pins.

The designer lays out both views of the work to correct scale. The locating pin C, the bushings and the locating pins D are drawn in order, followed by the feet E, placed to balance the jig and the work. Then the body of the jig can

should be .0005" smaller than the low limit of the hole in the work. The size of the hole in the bushing should be given both as a decimal and as a number or letter size of the drill. The center lines of all pins and bushings should be given from C; the distance should be large enough to clear the largest limit of the part with .001" or .002" clearance on each side. The length of the feet should be the large limit of the thickness of the work.

The jig body may be squared in a shaper, the corners rounded by hand with a file and the flat sides ground on a surface grinder. The holes are drilled, preferably by the drill block method which is the least expensive. The body B can be clamped to a cube block and the center lines and guide lines for the bushings laid out with a vernier height gage. The block can then be drilled and reamed for the pins and bushings. After drilling, the bushings and pins are turned in a bench lathe.

The double side jig shown at F, Fig. 14, is used to pin cams on both ends of a hub. The locating pin G is long

enough to go through both cams on both sides of the jig, otherwise the jig is the same as B.

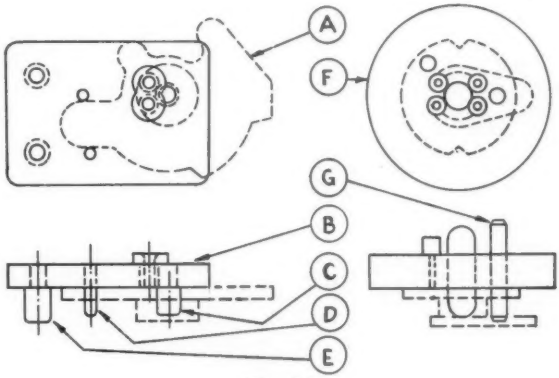


Fig. 14

Fig. 15 is a drawing of a combination plate jig. It is used to drill insert dies and the die holder in a drop forge shop. The views are of the jig only. The dotted lines A show how the insert dies are drilled in the jig. The dotted lines B show how the insert holder is drilled.

placing the die and then tightened. This prevents the work from coming out of the jig during drilling. When drilling the insert holder, the plates are removed and the main body C and keys D are used.

The design of this jig was relatively simple since the location of the holes from the keys and sides of the jig was the only critical dimension. The bush-

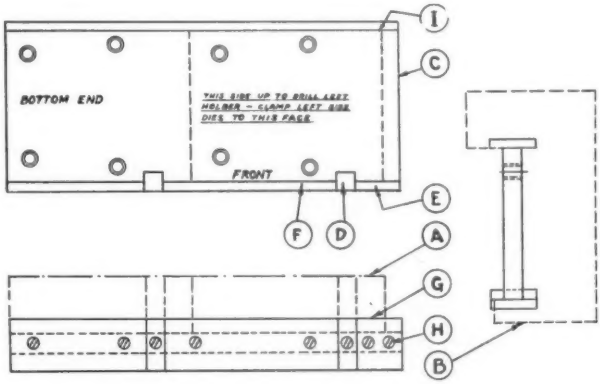


Fig. 15

The dies are placed in the assembly jig, being located endways by the key D, and sideways by the plates E, F, G and I. The plate I is loosened when

ings, then the locating keys and the sides were designed. The base and side plates were all made of cold rolled steel. The keys were made of water hardening tool

steel and ground after hardening. Standard commercial drill bushings were used. With right and left hand dies and holders, the jig was stamped as shown. On the opposite side the word "right" was substituted for "left."

All pieces were squared up in a shaper. The sides and lower end should be exactly square with the flat face and each other. The side plates were ground on the inside and screwed to the edges. The holes were located by the drill block method. The hole in the block was large enough to use a reamer to give a drive fit for the bushing. The keys were rough shaped, drilled, counterbored for the screw, hardened, ground and assembled to the jig.

.0005" smaller than the low limit of the hole in the work. The small end is a drive fit in the plate D. The work is clamped to this plate and is located from turning by the shoulder on D. The plate is screwed and doweled to the body. The drill bushings E are a drive fit in the main body and cleared where they pass through the plate D. The bushing F is to drill the hole in the side of the work and the bushing G the hole in the end. F is a drive fit in the side wall of the casting. To hold the bushing G, the block H has been screwed and doweled to the base. I and J are cold rolled plates, screwed and doweled to the channel casting to prevent it from springing when drilling the side hole. The lid K

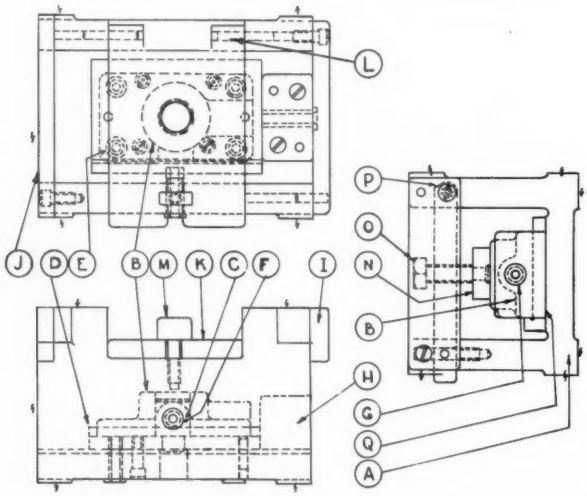


Fig. 16

In a shop where many drill jigs are made, several types and sizes of the standard castings are carried in stock. The standard channel casting A shown in Fig. 16, cut to size, forms the main body of the jig. B is the work being drilled. The work has been faced and the large hole bored and reamed. This jig is to drill the four holes in the base and one in the side and one in the end. The work is located over the stud C, which is made of tool steel and hardened and ground. The large end is is used only as part of the clamping device. When the lid contains bushings in order to maintain accuracy, hardened and ground washers should be used. Also, if greater accuracy is wanted, hardened discs can be inserted in the open end of the lid similar to those used on the pivot end. The lid pivots on the pins L and the open end is held down by the lid screw M. The work is held down by washer N riveted to the end of the screw O. The corner P of the lid is left as shown to hold the lid in the

(Continued on next Page)

"Make America Strong" Theme of N. I. A. A. Conference

The 18th Annual Conference and Exposition of the National Industrial Advertisers Association, held recently in Detroit, will long be remembered for the timeliness of its theme: "Make America Strong." This problem was the subject of examination at general sessions which heard the Honorable Robert Porter Patterson, Assistant Secretary of War, Edward J. Noble, recently Under Secretary of Commerce, and Raoul E. Desvernine, president, Crucible Steel Company of America.

Mr. Patterson spoke on "The Task Confronting the War Department and Industry". He outlined the work of the Planning and Procurement Branches of his office which are concerned with the business relations of the War Department with industry.

Mr. Noble, for whom the office of Un-

(Continued on Page 31)

(Continued from Page 24)

open position and to prevent it from falling to the drill press table.

The usual method in starting the design of this jig is to draw the three views of the work (see Fig 16), using a red ink which develops phantom lines to differentiate it from the rest of the drawing.

Then lightly draw in the method of locating. This is accomplished by the center pin and the flat shoulder plate. Then draw in the channel casting, placing it to suit the work. The bushings can then be placed and the block H added where necessary. Next draw the clamping device complete, including clamp screw, lid, etc. To finish the design add braces, screws and dowels where needed. The required notes, dimensions, finish marks and stock list complete the design.

The casting must be finished as shown by the finish marks. To be certain that the surface Q is accurate with the finished feet, it should be ground in a surface grinder. The locating plate D can be shaped of non-distorting steel, such as a high carbon, high chrome steel. Grinding stock should be left on the shoulder so that after hardening the shoulder can be ground to the correct distance from the main locating pin hole. The screw, dowel and clearance holes for the bushings can then be put in. None of these holes have to be especially accurate. The screw and dowel holes are later transferred to the casting. There should be at least a $\frac{1}{64}$" clearance around the bushing. This plate can now be hardened and ground, then by transferring the holes through the casting, the plate can be assembled to the casting. The cold rolled steel block can be shaped, screwed and doweled to the casting. The braces should be shaped and then screwed and doweled to the casting. All this should be done before boring the holes for the bushing. To add even the braces after boring might spring the casting enough to throw the holes slightly out of line. The four holes in the casting can be bored through the plate D with the casting placed so that D is on top. The casting can be stood on end and the hole bored for the end bushing. To locate the hole in the side the distance from the top of the locating plate to the bottom of the casting has to be established.

With a plug in the locating pin extending out of the bottom of the casting, the side hole can be bored next. The large locating pin can be made. The pin and bushing are next pressed into place. Clearance should be made for the points of the side and end drills. The lid can be shaped and assembled with the clamp and the lid screws.

PLASTIC MOLD DESIGNING

By GORDON B. THAYER
Plastic Design Engineer
General Industries Company

Article VIII of a Series

The relatively simple injection mold described below illustrates a practical method of solving a rather difficult problem—the ejecting of a long draw, thin section molded part. The loose bar design also has the advantage of providing a convenient, economical means of engraving various devices or lettering on the molded part.

For tool rooms and die shops called upon to build molds for plastics materials the suggestions made for the design of this type of mold should be of particular interest. *The Editor.*

The Design of a Loose-Bar Injection Mold

DESIGN requirements of a plastic molded casting occasionally do not allow the casting to be removed directly from the mold as it opens. This is true when the casting is undercut with respect to the line of travel or of the opening and closing of the mold. The usual practice is to modify the design as much as possible in order to make the simplest mold. The loose-bar type of injection mold is a useful design for overcoming the difficulty of ejecting a long draw, thin section casting.

The sliding box cover shown in Fig. 14, is a typical example of a casting which cannot readily be ejected directly on account of the long draw, 4 inches, and the thin section, .040 inch. Endwise molding which is required for direct ejection on opening the press is impractical with these characteristics. This is because the action of the ejector mechanism depends on the amount of opening travel. Also, the mold would be rather bulky—at least twice the length of the casting to allow space for the casting and for the ejector travel. By molding over a core attached to a loose bar, it will be possible to mold lettering on the top face of the box, as it will be drawn directly from the cavity as the mold opens.

The loose bar mold for the box cover is shown in Fig. 15. A side view and a view facing the ejection end platen are shown. The bar is to be removed manually and replaced by a duplicate bar so the castings may be stripped on a bench while the second bar is in the mold. No ejector device is required. The mold is simple, and consists of front and rear adaptor plates, cavity blocks and retainer, loose bar and core assembly, guide pins and retainer plate and the gating system.

Adaptor Plates

The two adaptor plates serve as backing plates for guide pins, bushings and

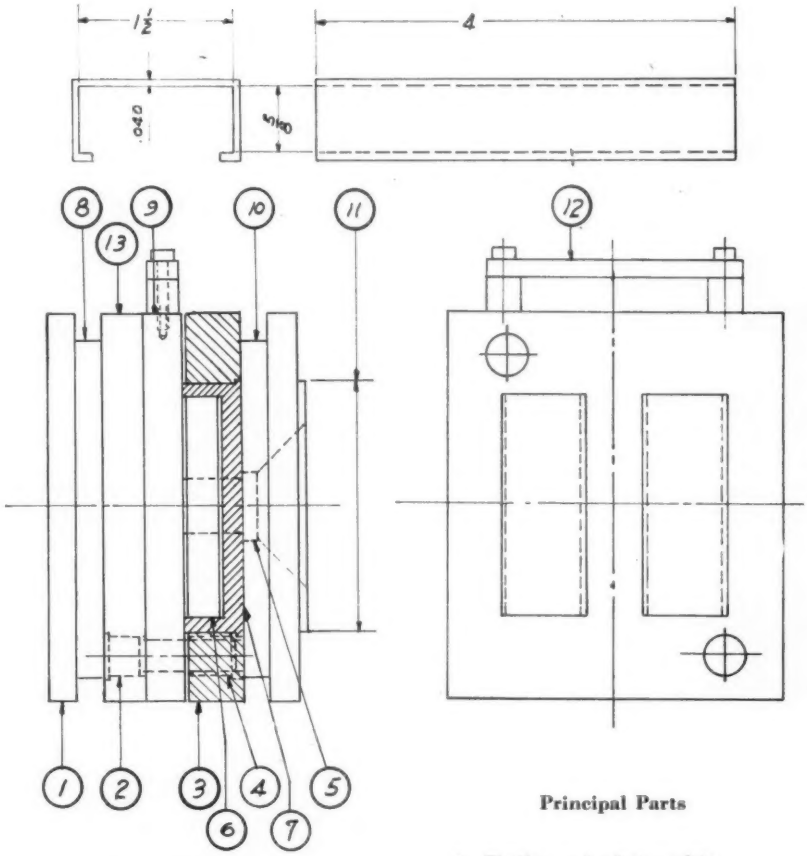


Fig. 14 (above) the sliding box cover the molding of which was most economically done by a loose-bar type of design.

Fig. 15. The loose-bar mold for the box cover. A side view and view facing the ejection end plates are shown.

cavity blocks. The ejection end plate (detail 1) need not be hardened as the guide pins have practically no tendency to sink in. This plate is made of plain flat stock and cold rolled steel may be used. If it is desired to grind the plate flat, machine steel should be used, as it will not warp when the skin is removed. The injection end plate (detail 10) receives more severe service, as it is the

Principal Parts

1. Ejection end adaptor plate
2. Guide pin
3. Cavity retainer plate
4. Guide pin bushing
5. Sprue bushing
6. Core block
7. Cavity block
8. Clamping slot
9. Loose bar
10. Injection end adaptor plate
11. Injection end mounting boss
12. Handle for loose bar
13. Guide pin retainer plate

backing plate for the cavity blocks. It should be hardened. This plate has a circular mounting boss and is bored out for entrance of the injection cylinder nose. No mounting boss is shown on the ejection end adaptor, as some designers prefer to let this end float and be located by the guide pins. A large hole in the press platen is not desirable as it weakens the platen enough to allow it to bend out of shape. On the injection end, it is necessary to have a rather large hole to allow the injection cylinder to enter as close as possible to the mold to prevent undue cooling of the plastics material as it travels through the nozzle into the sprue. So a mounting boss has been included on the injection end adaptor plate. This boss is shown at detail 11. Clamping slots (detail 8) are provided on both adaptor plates.

Cavity Blocks and Retainer

The cavity block (detail 7) is shown made from a single piece of material. As such, it may be hobbed from low carbon steel. Or it may be milled straight through and have a piece inserted for the bottom. In the latter case it should be made of alloy mold steel. The method of making the cavities is dependent upon the equipment available for machining. Hobbing may be quicker, as milling the sharp corners and filing them requires some time. If it is desired to produce the same cover with different letters or design, it may be well to use the inserted bottom, which carries the letters or design. Any number of different designs can be made by inserting a new bottom. The cavity block is held in the retainer plate by shoulders at each end. The retainer plate (detail 3) is made of alloy mold steel left soft. It is relieved to allow the cavity blocks to bear tightly against the opposing half of the mold.

Loose Bar and Core Assembly

The loose bar (detail 9) carries the cores which are shown at detail 6 and also in the front view. A handle (detail 12) is provided for lifting the bar from the mold. The bar is made of alloy mold steel and should be hardened. It is ground flat with no relief since this is provided on the opposing cavity retainer plate. Holes are bored for the guide pins. The mold builder may prefer to press in hardened guide pin bushings, even though the plate is hard. The cores are made of alloy mold steel hardened and polished. They are screwed to the loose bar. Some sort of retainer is necessary to assure that the bar will follow the press open and pull the core and sprue slug out of the cavity and sprue bushing. Such a device may be a simple spring pusher counterbored in the cavity retainer plate in such a manner as to push against the loose bar until the core and casting are disengaged from the cavity.

Guide Pins and Retainer Plate

Two guide pins are provided in this mold. They are shown at detail 2, and their bushings at detail 4. They are of hardened alloy steel retained by a shoulder at the rear. The bushings are held in the cavity retainer plate and the pins are held in their own retainer (detail 13). This plate may be of soft steel or alloy mold steel, if severe service is expected.

No water lines are shown in this mold. The large cores will have time to cool when they are on the bench being stripped. Some plastics materials require a warm mold, and if such material is used, it may be necessary to put water lines in the cavity retainer plate to keep the cavities warm.

The Gating System

Provision for introducing the material is made by the sprue bushing (detail 5). The gating is all in the cavity plate so that the runners will be drawn from the mold with the castings and will then lie flat on the loose bar to make stripping from the cores easy. The sprue bushing is made of hardened alloy mold steel. The sharp corners of the cores and cavities may give some trouble with flow lines until the gating is arranged properly. This is a matter for trial, and some experimenting may have to be done before the mold will operate properly.

The mold described represents about the simplest type of loose-bar or side-draw mold in commercial use. This effect is sometimes accomplished by means of cams or gears, in which case the molds operate entirely automatically.

A **Reader Requested** Article

Schools Provide Training for the Tool And Die Industry

The past few years have seen a steady increase in the number of schools that offer instruction and training in tool and die work. A few of the leading schools in the principal tooling centers are listed with details of courses currently available.

DURING the past decade the Contract Tool and Die Shops, as well as the Tool Rooms and Die Departments in the production industries, have not felt the need for expanding the supply of skilled tool and die makers, designers and engineers. With the reactivation of industry and the demands brought by the National Defense Program the need has been created for more skilled workers. Many firms are meeting this new demand by "Training-Within-Industry" schools. On the other hand, many machinists, tool and die makers, draftsmen, etc., recognizing the new opportunities in the tool and die field, are attending courses in tool and die making, designing and metal processing.

A course in tool and die making and heat treatment of tool steel is being offered in both pre-apprentice training (Day Division) and advanced trade extension work in the evening at the Samuel Gompers Trade School, 22nd and Bartlett Streets, San Francisco, California. Both are two-year courses. According to the instructor, Albert O. Hill, the day class is open to young men with some experience as machinists, and the evening extension class is open to journeymen, machinists and third-year tool and die making apprentices. This school has a complete tool and die shop, equipped with modern machine tools and heat treating furnaces. This equipment includes four lathes, two milling machines, five grinders, one shaper, four drill presses, one power saw, one arbor press, one die filing machine, two punch presses, four electrical furnaces, two gas furnaces, machine attachments and hand tools.

In the first semester drilling, sawing, milling, grinding, lathe and shaper work are included in the curriculum. Precision measurment, die designing and layout, die filing and setting and jig boring are included in the second semester. In the third semester, the students are taught the operations and design of cutting tools, lapping and tool grinding, gages and the operation of power presses. In the last semester, the building of jigs and fixtures and the study of heat treating together with pyrometry and hardness testing are taught. The related subjects, drafting and mathematics, are also covered each day apart from the shop work.

Ralph A. Wagner, chief die designer, Truscon Steel Company, has been appointed for the fifth consecutive year, instructor in Die Designing at the Cleveland Trade School by the Cleveland Board of Education. The class meets one evening each week for three and one-half hours and runs for fifteen weeks. The drawing board method of teaching is used and each student is given individual attention and advanced according to his ability. Mr. Wagner states that since the last semester seven of his students have reported that they received promotions or better positions through this course of instruction.

An evening class in elementary metal stamping is being offered by the John Huntington Polytechnic Institute, Cleveland, Ohio. The instructor, Mr. Glenn A. Barth, states that the course will consider the problems of general interest for men interested in stamping, die making or die design who wish to

familiarize themselves with the fundamental methods and reasons for proper die design in the production of metal stamping. The students are taught the use of tool steels and their substitutes; the theory of metal flow and shear and its adaptation to practical die methods; comparison of standard press equipment with new developments for special speeds and conditions; computation methods of practical value for pressure requirements of both presses and stampings; and the advantages of sound progressive multiple stage equipment. The student may present to the class problems and samples of stampings in which they may have a special interest and which would be of general interest to the group. Visits are made to plants to afford the student further comparison of modern methods.

Die, Jig and Fixture Training

The Designcraft—Engineering and Designing School in Indianapolis, Indiana, is conducting evening and Saturday morning classes in the design of dies and the fabrication of sheet metal parts, and due to the Preparedness Program, they are compiling a curriculum for the teaching of jig and fixture design, the instruction of which will begin about November 1. This new course will cover, generally, all requirements of the fabrication of cast parts such as drilling, milling, broaching, reaming, grinding, boring and the design of gages. The instructors are practical men who have had experience in this field. Each student is given three to five hours a week instruction at the school and is permitted to do as much home work as he possibly can, allowing the student to progress as rapidly as possible.

The College of Engineering of the University of Michigan is again offering their two-year course known as Metal Processing, designed principally as a survey of the functions of dies, jigs and fixtures. The student analyzes the current die designs and studies the problems in tool and die making from the simplest blanking dies to the more complex progressive and transfer dies. The student then is ready to design the stamping dies for the operations or parts assigned to him. The first is relatively simple while the second die is usually of a more progressive type which, in addition to developing proportion, also taxes his ingenuity in combining press operations for the particular job.

All Night Sessions at Buffalo

In Buffalo, New York, the Board of Education announces a National Defense Training Program in the vocational and technical high schools. There will be afternoon, evening and all-night sessions. Thirty courses are being offered including machine shop practice, metal processing, machine design, patternmaking, tool and die making and tool design. The courses in tool and die making and designing are being held at the Technical High School, Clinton and Cedar Streets.

Other schools having courses in tool, die, jig and fixture building, as well as tool, die and machine design, are:

The Carl Schurz High School, Chicago, Illinois. Charles Bohmer, Instructor.

Wright Junior College, Institute in Engineering, 340 North Austin Avenue, Chicago, Illinois. Norman Hedenberg, Instructor.

University of Illinois, Urbana, Illinois. C. E. Derrough, Instructor.

Acme School of Die Design Engineering, 129 West Colfax Avenue, South Bend, Indiana. Stanley R. Cope, Instructor.

Valparaiso Public Schools, Valparaiso, Indiana. August Breitbarth, Instructor.

George Trade School, 4110 Russell St., Detroit, Michigan. K. E. Knauss, Instructor.

West Side Trade School, 5525 Martin Street, Detroit, Michigan. Oswald L. Ludwig, Instructor.

Wolverine Trade School, 1400 West Fort Street, Detroit, Michigan. James Bullen, Instructor.

Fenn College, 1983 E. 24th Street, Cleveland, Ohio. V. D. Prian, Instructor.

Tool Steel Welding Service, 5005 Euclid Avenue, Cleveland, Ohio. H. A. Gonser, Instructor.

Dayton Trade Extension School, 130 East First St., Dayton, Ohio. P. C. Snyder, Instructor.

School of Vocational and Adult Education, 14th and Clark St., Manitowoc, Wisconsin. W. A. Trefz, Instructor.

"Make America Strong" Theme of N. I. A. A. Conference

(Continued from Page 25)

der Secretary of Commerce was created when Secretary Hopkins was incapacitated by illness, and who is credited with the conversion of the Department into an effective business organization, spoke on "Full Speed Ahead for Business—Make America Strong!".

Mr. Desvernine, who represented the Iron and Steel Institute on the Board of Directors of the National Industrial Conference Board and was counsel to the Crucible Steel Co. for five years prior to his election to the presidency of that company, discussed "Industry's Present and Future Responsibilities on National Defense". He stated that the way for Industry to help was to understand the "bottle-necks" which delayed production and then to correct the condition regardless of whether it was physical, mechanical, political or matters of economic principle. "The real problem," he maintained, "is to integrate Government and Industry in doing the one big job." Mr. Desvernine urged greater and freer cooperative planning among industrial groups. He asserted that such consultation and cooperation would prevent useless and wasteful duplication of facilities, result in lower production costs and assure more speedy and efficient production.

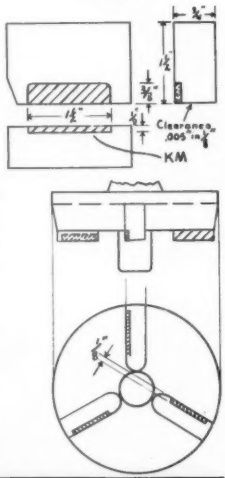
Three clinic sessions, longer than usual, featured ten clinics with subjects developed by chapter groups. The greatest number of displays of members' advertising ever assembled at a N.I.A.A. meeting attracted considerable attention and made the tasks of the Jury of Awards particularly difficult. Awards, plaques and honorable mention certificates, were made in four classifications: Trade Publication Advertising, Catalog Literature, Direct Mail and House Organs.

Tool · Die · Machine PROGRESS is proud of the fact that a series of cover advertisements prepared by Charles M. Gray & Associates for the Putnam Tool

(Continued on Page 39)

366% MORE PIECES PER GRIND
with this special
KENNAMETAL SPOT FACING TOOL

Special tools tipped with KENNAMETAL are cutting down production time on steel parts just as effectively as standard KENNAMETAL-tipped tools. The tool illustrated at right, for example, is a special tool made in the customer's own plant and tipped with KENNAMETAL grade KM. Three of these tools were used to spot face eyes in front of yolk forgings of S.A.E. 3140, as shown in drawing. They were operated at 115 R.P.M. and produced 350 pieces per tool grind. The high speed steel tools formerly used were run at 75 R.P.M. and turned out only 75 pieces per grind. In addition, KENNAMETAL produced a much smoother finish.



KENNAMETAL engineers gladly cooperate with tool designers in adapting KENNAMETAL to special tools. Send us your B.P.'s or drawings—no obligation.

NOTICE: KENNAMETAL tools cost no more than ordinary carbide tools —see our new price schedule.

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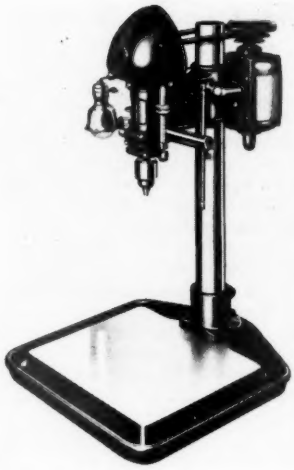
Improved Delta Drill Presses Offer Exclusive Features

Self-Aligning Drive and Free-Floating Spindle form important combination

THE Delta Manufacturing Company, whose power tools are used throughout the world, calls attention to the exclusive combination of a self-aligning drive and a free-floating spindle in the design of its 11" and 14" Drill Presses. These versatile presses, so useful in the average tool room and die shop whose steadily mounting volume of work includes variable production runs, are the only standard drill presses of their capacities that have both these features. A high speed telescoping drill press spindle drive requires a design that will stay in alignment.

The self-aligning features of the improved Delta drive, designed to overcome the ordinary troubles of the common four-bearing type, are patented. The



driving pulley is carried on a huge sealed-for-life ball bearing of special deep-groove tight-fitting design. It has a reserve capacity far above that ever required to take the belt pull and requires no lubrication or other attention. A very important feature is that this bearing, mounted by means of a special extension of the inner race, cannot be sprung.

The actual drive of the pulley is transmitted to the spindle through a floating sleeve which has spur-gear teeth cut around its hub. As these teeth mesh with an internal gear in the pulley, the sleeve can "float" in all directions except the driving direction. The floating sleeve drives the spindle through splines 3¼" long. The underside of the pulley is covered with a heavy pressed steel plate, which secures the bearing in the pulley and covers the pulley ribs—preventing wasteful "fan action" and keeping out dirt when the drill head is operated upside down.

The 11" and 14" Drill Presses, in common with the 17" Drill Press, are low in first cost, operate economically and are both adaptable and flexible.

Delta Drill Presses are fully described with features illustrated and prices given in the new catalog "Delta Industrial Power Tools," a copy of which will be sent on requests made to the Delta Mfg. Co., 632 E. Vienna Ave., Milwaukee, Wis.

Punch Replacement Expense Greatly Reduced

CONVENTIONAL removal and replacement of shoulder type punches which many radio panel piercing dies are designed and built to use, are serious and expensive when breakage occurs. Such a die has to be practically "torn down" to make the change.

On page 15 is illustrated a die designed to punch a pattern of 82 holes of varying size in a radio panel made of comparatively thick stock. Thirty-two of the holes are smaller in diameter than the thickness of the metal. It is, therefore, highly probable that these punches will have to be replaced frequently. This would be a costly process if the conventional type of punches were being used.

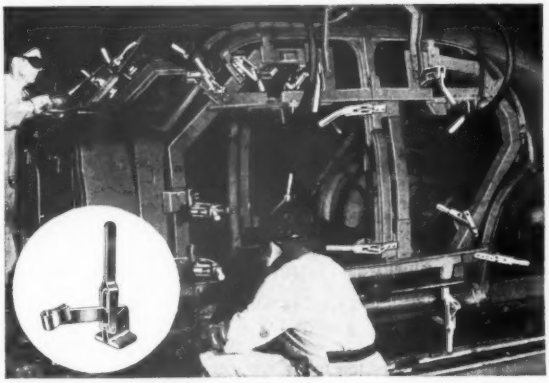
To overcome this disadvantage, Hovis Screwlock quick-change punch and die plates were used, thus giving this die the important advantages of interchangeability and quick-change.

Each punch and corresponding button die is quickly and easily removable. The patented, exclusive Hovis Screwlock design permits the removal of a broken or damaged punch by a quarter turn with a socket head screw wrench. The rapid replacement of punches greatly reduces costly down-time of a press or group of presses—another important consideration.

Because of the very close "limits" which are specified for this die, it is highly advantageous to be able to make both punch and die plates as single units. The Hovis Screwlock method is said to be the only one which makes it commercially possible to build a plate of this size—approximately 10" x 16"—for interchangeable punches.

The material which this die is called upon to pierce is $\frac{3}{32}$ inch aluminum, and the holes vary in size from .090 inch diameter to 2¼ inch diameter. Specifications are unusually severe because the part is intended for a military airplane radio.

For additional information about this die or other applications of Hovis Screwlock Interchangeable Punches, Button Dies and Retainers, write Hovis Screwlock Company, 3129 E. Larned St., Detroit, Mich.



DE-STA-CO

Quick Acting Toggle Clamps

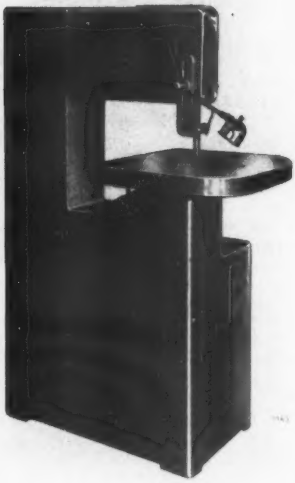
for holding parts in production:—

AUTOMOTIVE
AIRCRAFT
REFRIGERATION
ASSEMBLY
DRILLING
WELDING
ARC WELDING
SPOT WELDING
SOLDERING
MACHINING

Send for Bulletin No. 40

DETROIT STAMPING CO.
Established Over 25 Years
344 Midland Ave. - - - DETROIT, MICHIGAN

When you order or write about products described in TDM PROGRESS please mention the publication.



Grob Streamlines Heavy Duty Continuous Motion Filing Machine

GROB Brothers, Grafton, Wis., builders of die making machines, announce their new FA-18 Heavy Duty Continuous Motion Filing Machine of improved streamlined design. This machine has a throat of 18" but the same model with 30", 36" or larger throat is also manufactured.

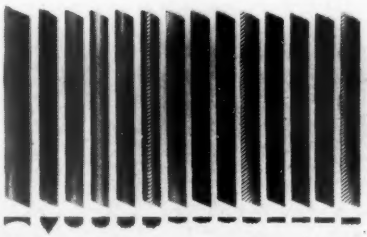
The machine consists of a one-piece heavy gauge welded steel frame. The tiltable table of box construction, heavily ribbed, is made of semi-steel and measures 20" x 20". Completely guarded, the machine has no moving parts exposed except where the files pass through the working zone. Three speeds, 80, 120 and 160 fpm to the files, are provided by the ½ hp motor and silent "V" belt drive built into the base.

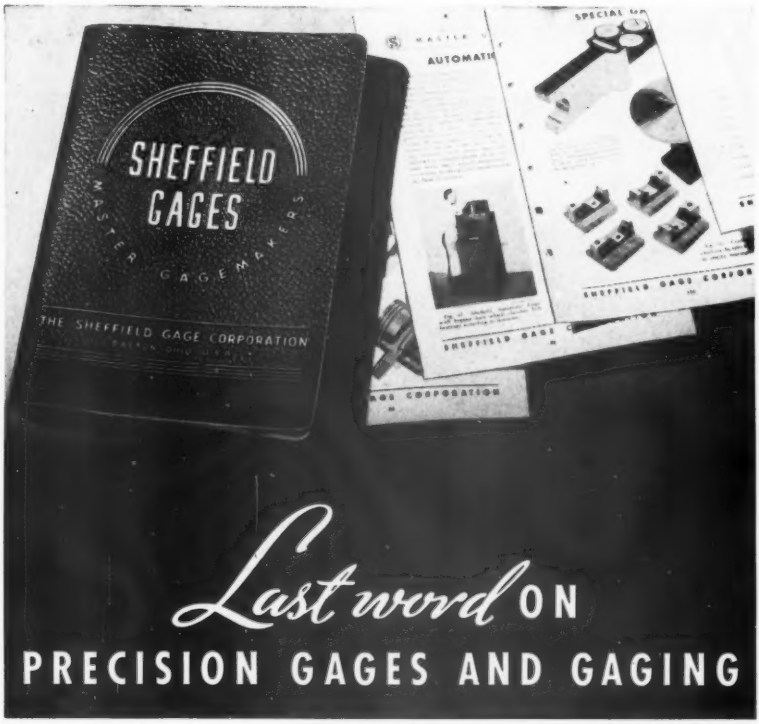
The files are attached to a chain which is driven by a lower pulley having spring-cushioned pins, providing a positive drive to the file-chain. Thus very little chain tension is required, insuring long life, yet no matter how much pressure is applied to the work the files will not slip nor will excessive pressure harm the machine.

As the file-chain is extremely flexible, two pulleys of small diameter can be used in the upper arm as idlers, a double advantage. The machine, in spite of the large throat, has a low total height and the file-chains are relatively short in length. Thus the new 18" throat machine uses file-chains with twenty 5" files while the older model with one idler pulley and a throat of 12" uses 18 files. To install a complete file-chain the operator stands in front, pushes one end of the chain over the top of the upper front idler pulley and keeps on feeding the chain which slides in the channels over the other idler pulley and comes out at the bottom, in front of the machine. It is a simple matter to connect the ends and put tension to the file-chain by a single lever movement.

A variety of types and shapes of files can be furnished. The files, manufactured by Grob Brothers, are made of a high grade alloy steel, insuring exceptionally long life. Standard files are furnished in single or double cut; fine, medium, coarse, or shear cut. Special files are made to order.

For complete information on the Grob Heavy Duty Continuous Motion Filing Machine, write Grob Brothers, Grafton, Wis.





"SHEFFIELD GAGES" just off the press is a comprehensive presentation of precision gages — design, construction and application together with standards and constants useful in practical inspection work.

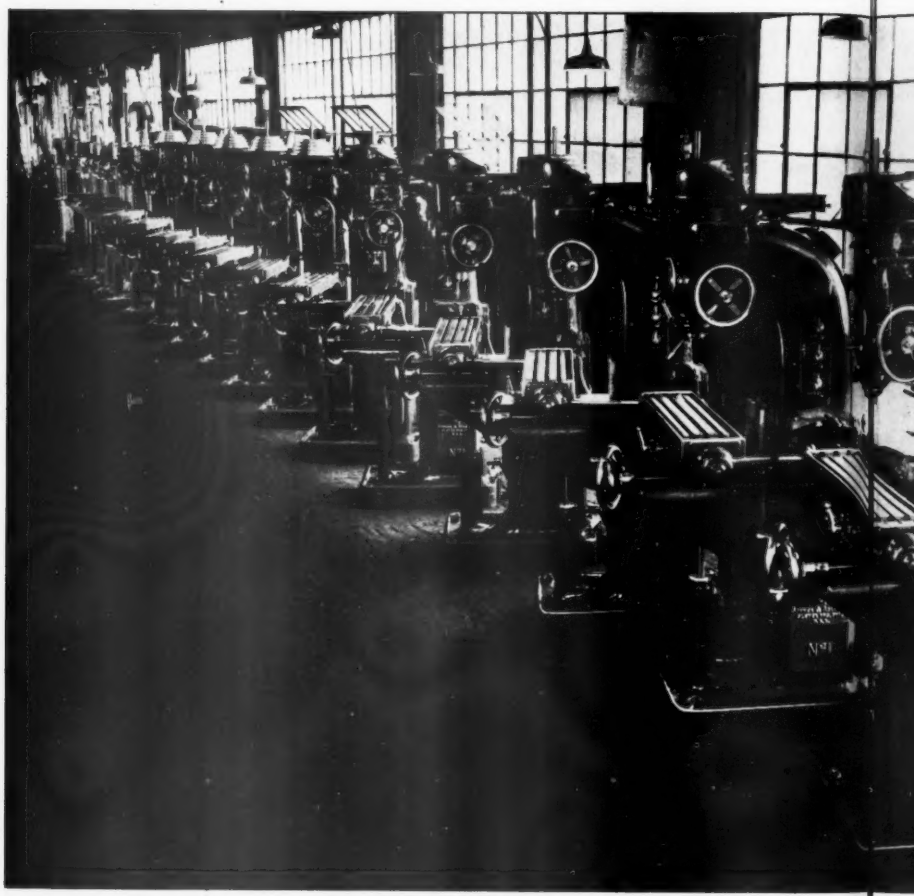
Manufacturers engaged in the manufacture of engines, machine tools, automotive or military equipment, or any enterprise where inter-changeability of parts is essential, will find this book very useful.

Write for your copy on your own letterhead—no obligation.

THE SHEFFIELD GAGE CORPORATION
1530 EAST THIRD STREET
DAYTON, OHIO, U. S. A.

When you order or write about products described in TDM PROGRESS please mention the publication.

INSISTENT DEMAND *brin*

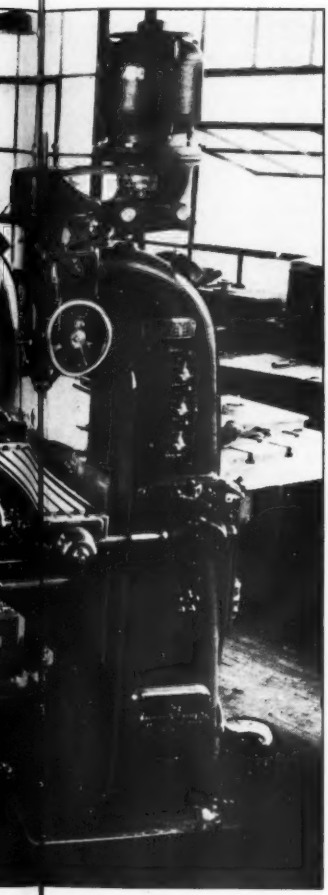


Over 20 years of experience in machine design and building backs up the performance of

THE SOMMER & ADAM

18511 EUCLID AVENUE CLEVE

brings volume production



formance of the new Cleveland.

DAMS CO.

CLEVELAND, OHIO

★

The Cleveland No. 1 Vertical Milling Machine, designed and built particularly for the exacting requirements of present day tool room, die and mold shop practice and the heavy duty of continuous precision manufacturing, is now being produced in larger quantities to meet the demand.

We invite you to send for descriptive circular.

SPECIFICATIONS

- **Capacity:**
  Longitudinal feed, 18"
  Cross feed, 8"
  Vertical feed, 16"
- **Table:**
  Working surface, 8" x 32"
  T-Slots, Three, 17/32"
  Power by 1/3 hp motor
- **Table Feed:**
  Twelve feeds with range from .6" to 12½" per minute.
- **Spindle:**
  Chrome nickel steel, heat treated and ground.
  Taper No. 30 (new National Standard)
  Mounted on Pre-Loaded Precision Ball Bearings.
- **Spindle Speeds:**
  Twelve, with range from 100 to 1850 r.p.m. Power from 1½ hp motor, flange mounted and adjustable with hand wheel to shift "V" belt for quick change of spindle speeds.
- **Feed Screws:**
  Mounted on Timken bearings; are provided with dials graduated in thousandths of an inch.
- **Feed Gears:**
  Chrome nickel steel; mounted on Timken bearings.
- **Floor Space:**
  36" x 42" front to back x 87" high.
- **Cutter Capacity:**
  1/16" to 3" mills.
- **Also High Speed Operation:**
  Design and construction of the Cleveland No. 1 Miller permit 8 operating speed changes ranging from 900 to 6000 r.p.m. when equipped with 2-speed motor with speeds of 1800 to 3600 r.p.m.

Recent Industry Publications

WINDSOR SPECIAL, a non-deforming air hardening die steel, is described in a new booklet just issued by Jessop Steel Co. Windsor Special is an inexpensive chromium-molybdenum-vanadium steel with a wide hardening range. The booklet will be sent at your request by the Jessop Steel Co., 610 Green St., Washington, Pa.

* * * * *

THE "TOOLMAKER", Dumore Precision Grinder No. 44, designed to bring precision tool room grinding within the reach of every shop owner, is quickly and easily converted from an external grinder to one for internal work. Complete specifications and illustrations of grinding jobs are included in Bulletin P-44. The Dumore Company, Racine, Wis., will send a copy upon request.

* * * * *

DISC WHEELS AND CYLINDERS, a 45-page handbook type booklet describing mechanically mounted disc wheels for grinding flat surfaces to precision tolerances, is the newest Carborundum Company publication. The booklet is well illustrated with representative applications and operating instructions. A copy will be sent upon request, by the Carborundum Company, Department P-311, Niagara Falls, N. Y.

* * * * *

THE NEW MOHR UNIVERSAL DRILL VISE, adaptable for a wide range of drilling operations and said to be unusually simple in manipulation, is the subject of a bulletin just issued. Advantages for tool room use and applications are described. A copy of this bulletin will be sent upon request. Write the Mohr Lino-Saw Co., 132 N. Union Ave., Chicago, Ill.

* * * * *

A NEW DIAL FEED PRESS, designed to handle with greater speed and accuracy such jobs as high speed marking, pressing, forming, punching and drawing, is described and illustrated in a brochure issued by the Federal Press Co. Simple in construction, the press is equipped with a special auxiliary safety stop, exclusive design of Federal cams to assure positive indexing, and other features. Write the Federal Press Co., Elkhart, Ind., for Bulletin TD-57.

* * * * *

"PENNIES IN THE PRODUCTION LINE", a circular issued by the Danly Machine Specialties, Inc., gives point-by-point reasons why "savings on die accessories does not always result in the lowest production cost". A complete die is illustrated and the cost of the various accessories—springs, screws, dowels, stripper bolts, etc., is given. For copies of this interesting circular, write Danly Machine Specialties, Inc., 2121 S. 52nd Ave., Chicago, Ill.

* * * * *

"SHEFFIELD GAGES", just off the press, is a comprehensive presentation of the design, construction and applications of precision gages. Standards and constants for practical inspection work help make the new catalog valuable to the tool room and die shop man. Write for your copy, on your letterhead, to The Sheffield Gage Corporation, 1530 E. Third St., Dayton, O.

* * * * *

"SELECTING THE RIGHT STEEL FOR PLASTIC MOLDING", a handy guide of particular value to the tool room and die shop that is entering the mold building field, lists the specifications, applications and recommendations of the mold steels of the Crucible Steel Co. of America. Well illustrated, it is practical to use as an aid in the selection of mold steels. This booklet also lists branch offices and warehouses at which these steels are stocked. Write for your copy to Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.

* * * * *

"MEEHANITE, THE METAL FOR CAST-TO-FORM DIES", published as Bulletin No. 11 by the Meehanite Research Institute, is a four-page illustrated booklet giving a table of properties available in Meehanite dies as well as a variety of applications and performance records. A copy will be sent on request. Write Meehanite Research Institute, 311 Ross St., Pittsburgh, Pa.

* * * * *

THE RIVITOR, a bulletin on the Tomkins-Johnson Co. machine for automatically feeding and setting solid rivets, has just come from the printer. This bulletin goes into engineering and practical details on the actual riveting operation. Specifications of the Rivitors in this company's line are included. For a copy of the Rivitor, Bulletin RP-4, write The Tomkins-Johnson Co., 630 N. Mechanic St., Jackson, Mich.

* * * * *

GRAND RAPIDS SURFACE GRINDERS, Bulletin GL-100, illustrates and describes the complete line of Gallmeyer & Livingston

Co.'s Hydraulic Feed Surface Grinders. Design and construction features, accessories and full specifications of each size and type of grinder are given. For a copy of Bulletin GL-100, write Gallmeyer & Livingston Co., 304 Straight Ave., SW., Grand Rapids, Mich.

* * * * *

CRALEY OFF-SET BORING HEADS, an eight-page booklet, gives the complete specifications of the Craley line so widely used in the precision tooling industry. Prices are also included for combination and special heads and for special equipment as well as for the standard heads. For your copy, write C. C. Craley Mfg. Co., Shillington, Pa.

* * * * *

A WEIGHT AND DEFLECTION CHART, listing standard pressure pad, stripper and knockout springs for all styles of dies, is announced by Precision Spring Corporation. The chart indicates the free length, solid height or length of spring fully compressed; load required to compress solid; and load required to compress spring one-eighth inch. A copy of Weight and Deflection Chart is available on request from the Precision Spring Corporation, 15400 Woodrow Wilson Ave., Detroit, Mich.

* * *

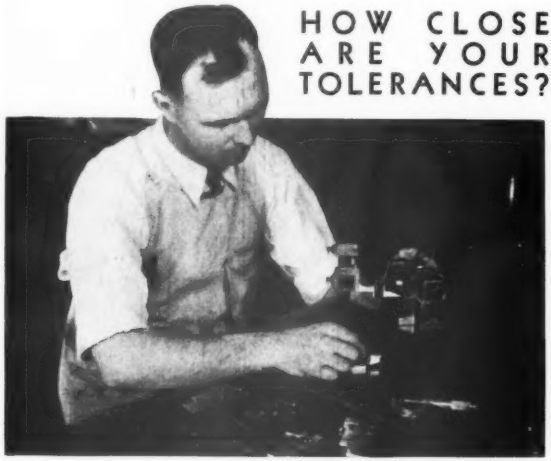
TOOL STEEL HANDBOOK, a new 160-page "Handbook of Special Steels—Their Properties, Uses, Fabricators", a valuable source-of-supply register, contains the latest data on the characteristics and applications of Stainless Steels, Tool and Die Steels, Electrical Steels, Carbon Steels and Special Alloy Steels. Supply is limited. Ask your Allegheny distributor or write Allegheny Ludlum Steel Corp., 2325 Oliver Bldg., Pittsburgh, Pa.

"Make America Strong"

(Continued from Page 31)

Company won honorable mention in the Trade Publication, Advertising, limited division, classification.

New N.I.A.A. general officers named are: Richard P. Dodds, Truscon Steel Co., president; E. J. Goes, Koehring Co.; H. V. Mercready, Magnus Chemical Co.; Terry Mitchell, Frick Co.; W. D. Murphy, Sloan Valve Co.; L. J. Ott, Ohio Brass Co.; and R. T. Reinhart, California Corrugated Culvert Co., vice-presidents; and E. C. Howell, Carboloy Co., secretary-treasurer.



When the difference between an O.K. or a reject is only a line or two on the vernier, it pays to use Starrett Verniers. Starrett Catalog No. 26-DM shows the complete line. Write for it.

THE L. S. STARRETT CO.
ATHOL, MASSACHUSETTS, U. S. A.

Standardize on

BUY THROUGH YOUR DISTRIBUTOR

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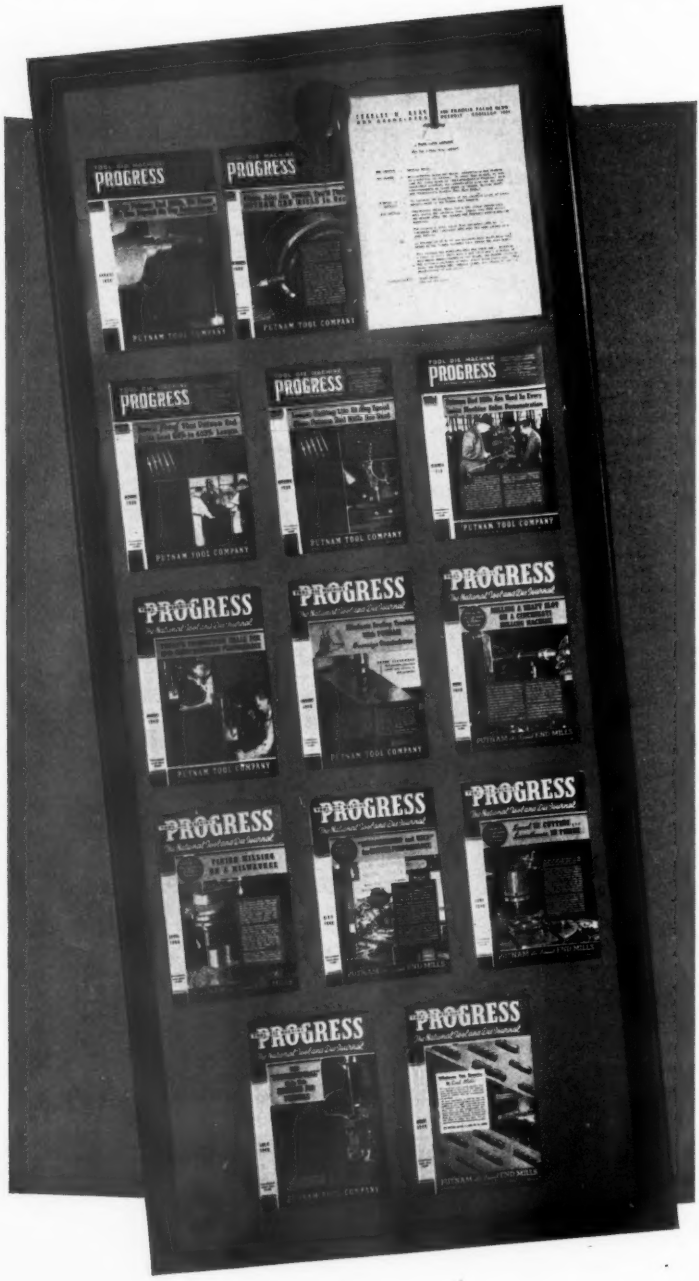

PROGRESS
PUTNAM TOOL COMPANY

250% Sales Gain Helps to Win N. I. A. A. Honorable Mention

We gratefully acknowledge permission from Charles M. Gray and Associates (agency) and the Putnam Tool Company (advertiser) to present a reproduction and description of the latter's Tool·Die·Machine **PROGRESS** advertising campaign which won Honorable Mention awards at the National Industrial Advertisers' Conference in Detroit.

* * * * *

We quote from Mr. Gray's letter: "On the award certificate appears the copy: 'For the Advertising Campaign which, in the opinion of the Jury of Awards, is conspicuous for the excellence of its planning and execution.' The 'planning', of course, can also be interpreted to include the choice of media. In the actual judgment of the panels, special attention was also given to results. In both cases, you have no need to be modest about your part in helping to 'bring home the bacon'. As typical of the generally excellent results obtained, you can mention that two of the advertisements were responsible for a 250% sales increase within two months on one of Putnam's standard cutting tools."

* * * * *

In the data sheet accompanying the display, there are also very gratifying figures setting forth the company's increase in total sales during the period of the campaign, the number of new accounts added and a brief statement of the company's remarkable progress in the cutting tool field.

* * * * *

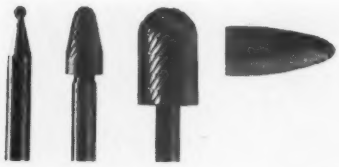
With pardonable pride may we point to the part which we were permitted to play in this truly remarkable sales achievement?

TOOL · DIE · MACHINE PROGRESS

the Journal of Supreme Readership Among Designers, Builders and Users of Precision Tooling

Severance Cutters Have Unusual Design Features

THE Severance Midget Milling Cutters, made by the Severance Tool Manufacturing Co., are available in a wide variety of shapes and sizes and offer a number of unusual design features:



1. The cutting teeth on taper and ball nose cutters are grouped in sections, eliminating dead ends.
2. Tools of ⅜" diameter or larger are designed having taper inserted shanks—an exclusive Severance economy feature.
3. Disc cutters and tools having end cut also have sectional tooth formation, reducing or eliminating chatter.
4. Chatterless teeth, for Countersinks, Ball Socket Reamers, and other coarse tooth cutters, pioneered commercially by Severance, have teeth on each tool developed on at least two different angles.

The group of cutters shown illustrate representative standard Severance Midget Milling Cutters. All cutters are high speed steel, ground from the solid after hardening. Severance cutters can be made with collars, shoulders, extra long shanks, flat or safe areas, or sharp points. The company is equipped to design and build cutters to meet special requirements.

The Severance Tool Manufacturing Co. is also equipped for complete regrinding and reconditioning service.

For full information ask for "Severance Midget Milling Cutters," Special Tools Catalog No. 12. Write Severance Tool Mfg. Co., 1506 East Genesee Ave., Saginaw, Mich.

Danly Kwik-Klamp Is Popular

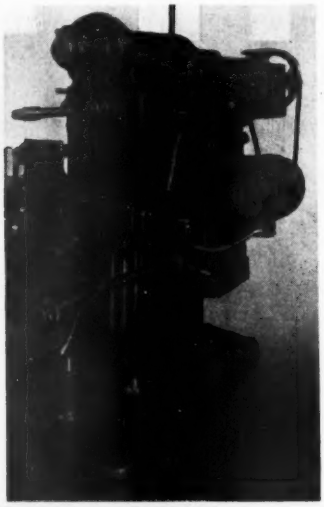
The Danly Toggle Clamps, the Kwik-Klamp, equipped with the new, exclusive swivel base, have proven very popular, particularly in the California and Buffalo districts, according to an official of the company.

Modernize with

FLEXOID SPEED CONTROL

REVOLUTIONARY FOUR AND EIGHT SPEED TRANSMISSIONS

The FlexoiD 4 and 8 SPeed Control units will give your present line shaft driven machines all the advantages of new individually driven machines. Units are sturdy, compact and foolproof, with adjustments provided for input and output drives. A single handwheel control (at a remote position if desired) changes all speeds. All gears and shafts are alloy hardened steel, running in S.K.F. ball bearings. No pilot bearings or bronze bushings to wear out. Write for descriptive data and prices.



The Smith Power Transmission Co.
1545 EAST 23rd ST., CLEVELAND, OHIO

When you order or write about products described in TDM PROGRESS please mention the publication.

Scherr Adds Five-Block Set to Ultra-Chex Line

THE George Scherr Company, Inc., announces that it has just added the MECHANIC'S OWN set to its line of Ultra-Chex precision length standards. Designed as a unit for the toolmaker's and mechanic's tool box, this small five-block set will enable the individual toolmaker to produce a given tool, fixture, jig, gage or work piece with

the assurance that the results will be correct to specified accuracy limits.

With modern tooling tolerances getting closer and closer it is to the advantage of the experienced shopman to have his own set of Ultra-Chex ready for constant use. If each toolmaker works with Ultra-Chex, rejections, errors, uncertainties and disputes can be reduced to a minimum.

The MECHANIC'S OWN set consists of five gage blocks accurate to 8 millionths of an inch, in the following dimensions: 1"—.500"—.250"—.125"—.0625". It is believed that this set will be especially valuable during these times, when precision manufacturing, interchangeability and accuracy to close limits are so essential for the success of the Defense Program.

Complete information on the MECHANIC'S OWN and other sets of Ultra-Chex will be sent on request. Write George Scherr Co., Inc., 128-B Lafayette St., New York, N. Y.

Micromatic Hone Doubles Space

Micromatic Hone Corporation, Detroit, manufacturers of honing machine tools, recently moved into larger quarters in a new location at 1345 E. Milwaukee Ave. According to Kirke W. Connor, president, the new quarters represent an increase in space of 100 per cent over the previous space used by this company.

A little CERROMATRIX saves a lot of *fitting and filing*

AMERICA'S tremendous defense program makes it more than ever necessary to consider the time element in product design. Astonishing savings in time can be accomplishd with CERROMATRIX in anchoring stationary machine parts that ordinarily require costly drive fits. Quick, accurate alignment of bushings for shaft bearings is another important use for this versatile alloy.

The simple procedure for both is described in detail in a valuable 36-page booklet—THE CERROMATRIX MANUAL. This manual is literally packed with information needed in every progressive metal-workng shop that is interested in saving and making money. Send for your free copy today.

CERRO DE PASCO COPPER CORPORATION

40 Wall Street New York, N. Y.

British Associates: Mining & Chemical Products Ltd., London
Canadian Distributors: Dominion Merchants Ltd., Montreal

When you order or write about products described in TDM PROGRESS please mention the publication.

Contract Shop Directory of Precision Tool Building Facilities

Production plants, particularly those co-operating with the National Defense Program, are finding it necessary to locate new sources for their Precision Tooling requirements. We are listing here the names and addresses of those Contract Shops, together with the various types of Precision Tooling they build, whose modern facilities are capable of making the additional tooling required. Some are equipped for small and medium-sized work, others for large. Many do designing and engineering or are equipped for making precision specialties of every description. Still others operate machine production plants and manufacture parts, stampings, die castings, plastics, forgings and complete assemblies. Space will not permit us to list the more than 3500 Contract Shops in the United States. This list of shops and services has been compiled from data furnished directly to us. They will be glad to quote on your immediate requirements.

New England States

CONNECTICUT

Connecticut Tool & Eng. Co., 109 Holland Ave., Bridgeport. Tools—Gages—Jigs—Fixtures—Machines—Dies—Stampings—Die Castings

Grandahl Tool & Mach. Co., 1200 Park St., Hartford. Tools—Gages—Jigs—Fixtures—Dies—Stampings—Screw Machine Products—Specialties

Grilley & Haven Mfg. Co., 1600 Seaview Ave., Bridgeport. Tools — Dies — Jigs — Fixtures—Gages—Machines—Stampings—Specialties

Hartford Special Machy. Co., 304 Homestead Ave., Hartford. Machines—Specialties

Parker Stamp Wks., Inc., The, 1200 Park St., Hartford. Tools—Dies—Molds

Schroeder Bros. Mfg. Co., The, 110 Brook St., Torrington. Tools—Jigs—Fixtures—Machines—Dies—Stampings—Specialties

Schultz Machine Shop, 246 Rocky Hill Ave., New Britain. Tools—Gages—Jigs—Fixtures—Machines—Dies—Stampings

MASSACHUSETTS

Carlson Bros. Tool & Mach. Co., Inc., 15 B St., So. Boston. Tools—Gages—Jigs—Fixtures—Machines—Specialties

Clarke & Co., C. E., 1934 Revere Beach Pky., Everett. Machines

Grimes & Harris, Inc., Leominster. Tools—Jigs—Fixtures—Dies

Oliver Mach. & Tool Co., Inc., 146 Oliver St., Boston. Tools — Gages — Jigs—Fixtures—Machines—Dies—Molds — Stampings

Progressive Tool & Die Co., 25 Foster St., Worcester. Tools—Gages—Jigs—Fixtures—Machines—Dies—Molds

Stacy Machine Wks., Inc., 70 Leete St., Springfield. Tools — Jigs — Fixtures—Machines

RHODE ISLAND

Taft-Peirce Mfg. Co., The, Woonsocket. Tools—Gages—Jigs—Fixtures—Machines—Dies—Molds—Stampings—Screw Machine Products—Specialties

Middle Atlantic States

MARYLAND

Freyman & Sons, J. E., 3627 Keswick Rd., Baltimore. Tools — Jigs — Fixtures — Machines—Dies

Hutcheson's Sons, William, 1567 Ridgely St., Baltimore. Tools—Jigs—Fixtures—Machines—Dies—Stampings—Screw Machine Products

NEW JERSEY

Ace Tool & Mfg. Co., 532 Mulberry St., Newark. Tools—Dies

Atlas Tool Co., 330 Waverly Ave., Newark. Tools—Gages—Jigs—Fixtures—Machines—Dies—Stampings

Christiansen, C. B., 6 Dawson St., Newark. Tools—Gages—Jigs—Fixtures—Machines—Dies—Molds—Stampings — Screw Machine Products—Specialties

Kuhn & Jacob Moulding & Tool Co., 1200 Southard St., Trenton. Molds—Plastics

Viking Tool & Mach. Corp., The, 6 Main St., Belleville. Tools—Dies—Jigs—Fixtures—Gages—Molds—Machines—Stampings Specialties

NEW YORK

Acme Mechanical Shops, 380 Canal St., New York. Tools—Jigs—Fixtures—Machines—Dies—Stampings—Specialties

Acme Pattern & Machine Co., 1559 Niagara St., Buffalo. Tools—Gages—Jigs—Fixtures—Machines—Dies—Patterns

Beaver Machine & Die Casting Corp., 1136 W. Belden Ave., Syracuse. Tools—Gages—Jigs—Fixtures—Machines—Screw Machine Products

Conrad & Moser, 8 E. 12th St., New York. Tools—Molds—Jigs—Fixtures—Machines

Curran Machine Works, Long Island City. Tools—Jigs—Fixtures—Machines—Dies—Molds—Stampings—Specialties

Doyle Mach. & Tool Corp., 326 W. Taylor St., Syracuse. Tools—Gages—Jigs—Fixtures—Machines—Dies—Molds—Specialties

Eureka Tool & Machine Co., 27 W. 55th St., New York. Tools—Jigs—Fixtures—Machines—Dies—Molds—Stampings—Plastics—Screw Machine Products

Force & Co., Inc., Wm. A., 216 Nichols Ave., Brooklyn. Tools—Gages—Jigs—Fixtures—Machines—Dies—Specialties

MacCordy Mach. Tool & Die Co., 258 S. Third St., Fulton. Tools—Gages—Fixtures—Machines—Dies—Stampings

Mechanical Die & Tool Co., 11 New York Ave., Brooklyn. Tools—Fixtures—Dies—Molds—Plastics

Monroe Tool & Die Co., 76 Seneca Ave., Rochester. Tools—Gages—Jigs—Fixtures—Machines—Dies—Stampings

Noesting Pin Ticket Co., Inc., 728 East 136th St., New York. Dies—Stampings—Specialties

Rane Tool Co., Inc., 17 Ross St., Jamestown. Tools—Dies—Jigs—Fixtures—Gages—Machines

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Stein & Co., Wm. P., 424 St. Paul St., Rochester. Tools—Gages—Jigs—Fixtures Machines—Dies—Molds

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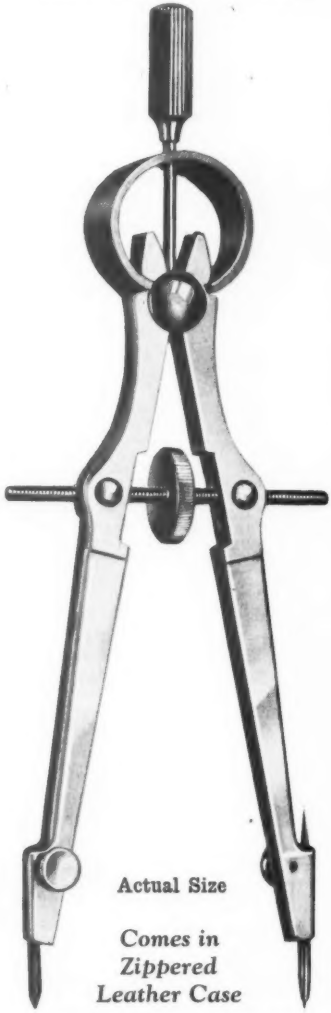

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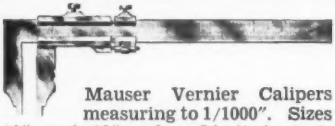

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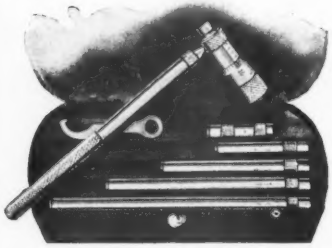

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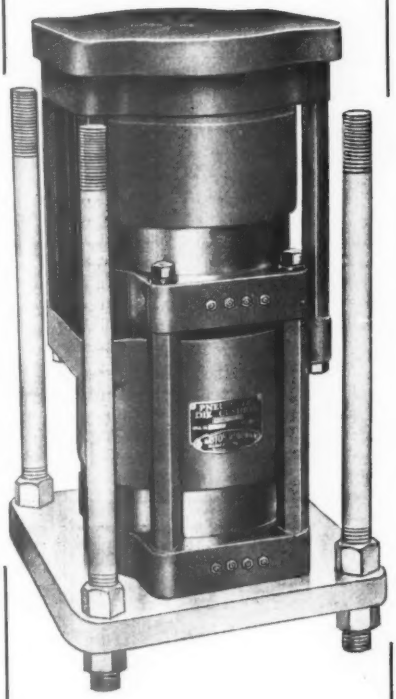

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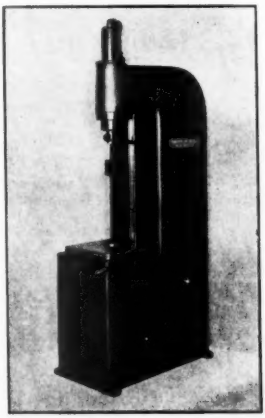

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(Continued on Page 58)

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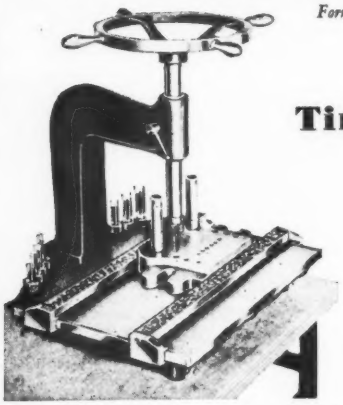

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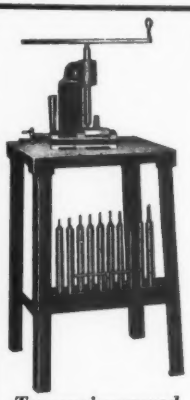

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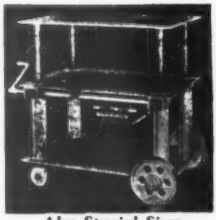

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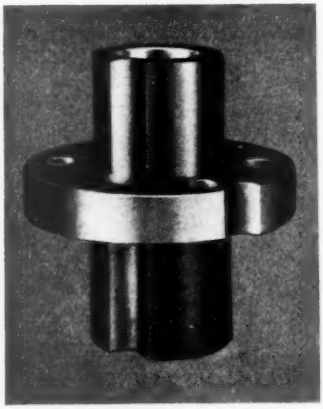

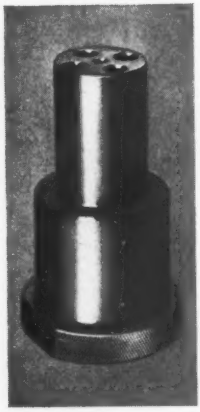

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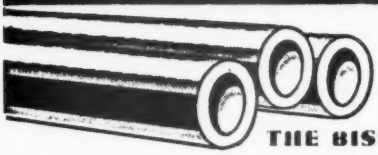

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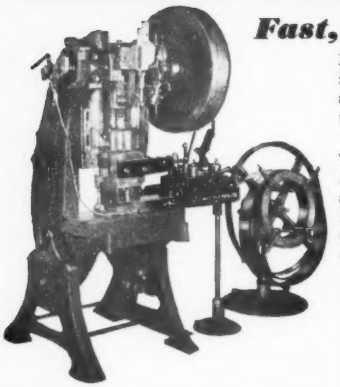

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(Continued on Page 58)

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(Continued from Page 50)

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(Continued from Page 57)

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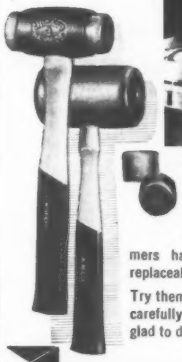

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Belleville, Ill.
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Chicago, Illinois

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OHIO TOOL COMPANY
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(Cont'd on Page 62)

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YOU CAN BACK OUT BROKEN TAPS *with* WALTON TAP EXTRACTORS

No annealing, drilling, or delaying of work.

Stock sizes from No. 4 machine screw to 1½", in 2, 3, or 4-flute styles.

In world-wide use for 30 years on both production and maintenance tapping.

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Columbia is ready to assist with the best possible materials, complete useful information and able sales-service men to help users get the fullest advantage of these products.

It pays to use Good Tool Steel.

COLUMBIA TOOL STEEL COMPANY
ARTHUR T. CLARAGE PRESIDENT
GENERAL OFFICES AND WORKS
CHICAGO HEIGHTS, ILL.

Cont'd from Page 61

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3338 Payne Ave. HEnderson 8644
EXTERNAL CYLINDRICAL LAPPING MACHINES
Special Machinery
TOOLS, DIES, JIGS, FIXTURES

***THE SOMMER & ADAMS CO.**
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Economical Machine Work Done.
Let us quote on producing machine parts for you. We are equipped to do GENERAL MACHINE WORK *of all types.*

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TOUGH
STEEL LETTERS & FIGURES, NUMBERING MACHINES, MARKING MACHINES, STAMPS & DIES
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MARKING PROBLEMS INVITED
• • •
SEND FOR LATEST CATALOG
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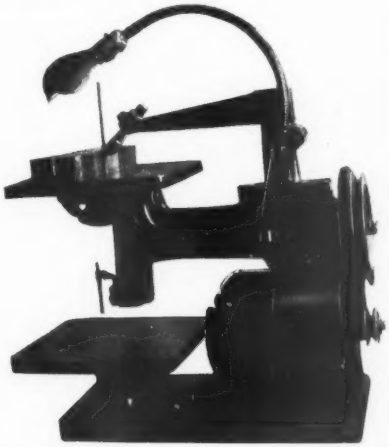
261 North Broad Street
ELIZABETH, N. J.

New Duplex Die and Punch Filing Machine

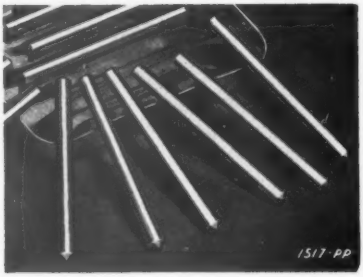
THE new Duplex Die and Punch Filing Machine announced by Marburg Brothers, Inc., is a "toolmakers' indispensable double-purpose machine for finish-filing both dies and punches". Equipped with two 10" square tables, depth of throat 9½", the upper table takes files to 5" or more in length, the lower table to 3". The tables are accurately ground and large enough to accommodate the average run of dies and punches.



The illustration shows the Duplex in use as a die filer. The upper table is swivelled into working position for the

(Continued on Next Page)

CUTTER BLANKS



★ Gorton hardened cutter blanks in both short and long sizes (from 1½" to 4") are available in both high-speed and special carbon steels. They are described in the new Gorton Accessories Catalog.
SEND FOR YOUR COPY TODAY
George Gorton Machine Co.
1119-13th Street
RACINE WISCONSIN

No mirror or awkward positions are needed when using the Lufkin Universal Indicator. It has two reading faces—one on the flat side and one on the end. You can take readings direct from the tool, no matter how it is used. See your dealer.
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LUFKIN
SAGINAW, MICHIGAN • New York City
TAPES RULES PRECISION TOOLS

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When men think of tool chests, they naturally say "Gerstner Chests," for the skilled workmen of America have been using them and recommending them for 34 years.

Write for our Free Catalog.

GERSTNER TOOL CHESTS

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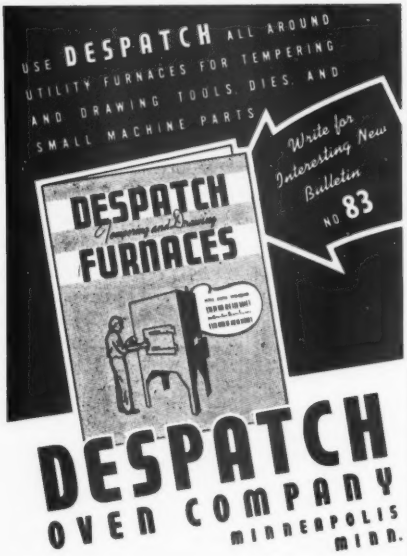


Die and Punch Filing Machine

(Continued from Page 63)

conventional type of filing; the file holder operates from below and the file penetrates the die. This table may be set in any compound angle, up to 15° toward the rear and both sides and up to 45° toward the front.

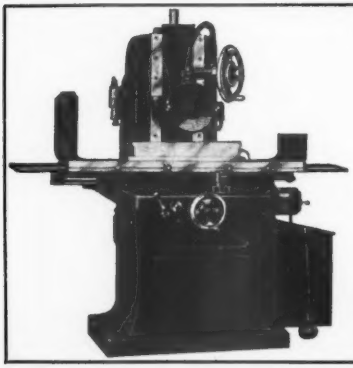
To operate the machine as a punch filer, the upper table is tilted out of the way, leaving the lower or punch table ready for filing. The punch file operates from the top but does not penetrate the table. The depth of the file movement can be accurately controlled through a stroke adjustable from 0 to 1½", making it possible for the lower end of the punch file to just clear a punch heel. Should this file strike any obstruction inadvertently the stroke, being set very sensitively, will automatically and instantly stop, preventing any damage to work, file or machine.

Regular machine files can be used on the Duplex. Speeds of 350 and 525 strokes per minute are available through a 2-step pulley and V-belt. A flexible light in ball socket and a set of wrenches are standard equipment.

For full specifications of the Duplex Die and Punch Filing Machine ask for Circular F-1P. Write Marburg Brothers, Inc., 90 West St., New York, N. Y.

Ohio Gear to Distribute Browning Line

The Ohio Gear Co., Cleveland, announce their appointment as national distributors for the products of the Browning Manufacturing Co., Maysville, Kentucky. A complete line of V-Belts and multiple pulleys will be stocked.



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Provide for Tool Room Accuracy at Production Speeds Built in Many Sizes

New Bulletin GL-100 on Request

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Hardening with the oxyacetylene flame by direct application is fast, efficient and economical for numerous parts and products. Research carried on by Lakeside assures uniformity of treatment. We maintain the finest equipment for spot, progressive and spinning operations. With our new automatically controlled furnaces we offer a complete heat treating service —including Nitriding, Chapmanizing, Aerocasing, Carburizing and Cyaniding.

24 Hour Service — Call HEnderson 9100

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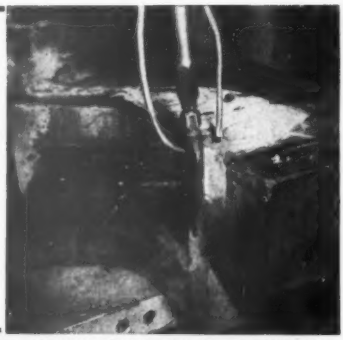
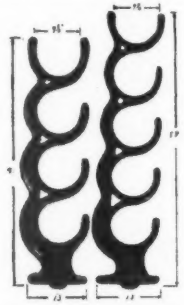


Yohe Supply Co. Introduces New 5-Arm Rack

A NEW 5-arm rack announced by the Wm. S. Yohe Supply Co., designed to give a 20% increase in carrying space and to increase the proportion of stock stored at convenient shoulder height, occupies no more floor space than the same company's standard 4-arm rack and, like the latter, is self-balancing. The 5-arm rack, cast of high grade machinery iron,



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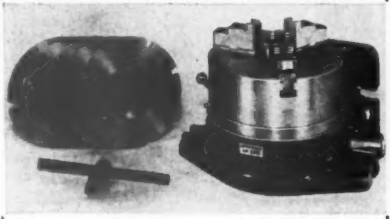
Modern Adaptability



The Hartford "Super-Spacer" is a superior spacing device adaptable for the control of accurate milling, drilling, slotting and planing operations. Speeds and feeds are limited only by the capacity of the holding means and the power of the machine.

Illustrated Circular on Request

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STYLE B **permit machining bore and facing bottom in same operation. Also used for removing radius in bottom of blind holes.**

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Licensed manufacturers of all types and designs of Carbide Tipped Tools.

Style A

When you order or write about products described in TDM PROGRESS please mention the publication.

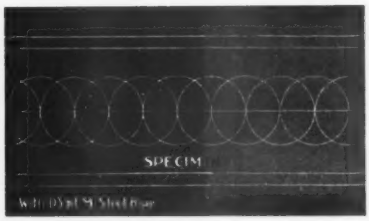
THE HANDIEST RACK YOU EVER SAW

Greatest Capacity—Smallest floor space

4 arms, 51" high, stacks 10,000 lbs.; 5 arms, 57" high, 12,000 lbs. flat or round stock. 3 stands for 20' lengths; 2 for 12' or shorter. Use against wall or back to back in center of room. Cost is small, value big.

Write for circular and prices.

Wm. S. Yohe Supply Co.
507 Gibbs Ave., N. E., Canton, O.



DYKEM STEEL BLUE
STOPS LOSSES
making dies & templates

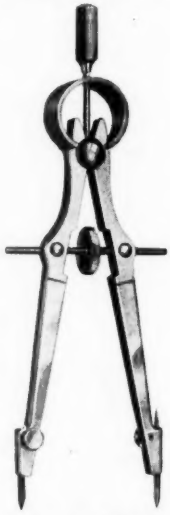
Simply brush on; ready for the layout in a few minutes. The dark blue background makes the layout lines show up in a sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY
2201 N. 11th STREET ST. LOUIS, MO.

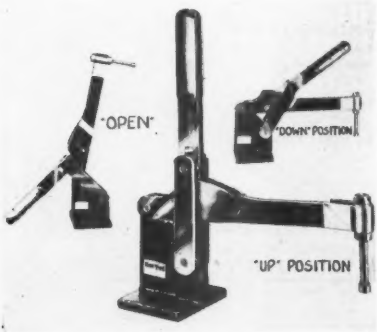
Peters Co. Introduces New Bow Pencil

THE Peters Company, Detroit, Mich., announce their "Petco" Bow Pencil, the first instrument offered in their new line of American made drawing instruments. A number of other instruments and combinations will be offered later.



The holding bar and button holder are made of stainless steel. The heavy hand-made head spring is lap finished. The legs are made from Zamak Number 5 with center bronze bearings; the center wheel adjusting screw threads 48 to the inch and the lead and pin screws are all of stainless steel.

(Continued on Next Page)



KNU-KAM-KLAMPS

Two sizes, four models now available.

The cam action of the **KNU-KAM-KLAMP**, plus the linkage action for quick return enables this new clamp to be used for holding parts that vary in thickness, being a vast improvement on the standard non-adjustable toggle clamp. Withstands vibration, hard knocks and rough usage.

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16941 Hamilton Ave.
HIGHLAND PARK MICHIGAN

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DOWEL PINS

We maintain an unusually large stock of Dowel Pins—including many sizes not ordinarily carried.

When you need Dowel Pins, try Die Supply first.

Prompt and dependable delivery.

Ask for Accessories Catalog

DIE SUPPLY COMPANY

1390 E. 30th St. Cleveland, O.

New Peters Bow Pencil

(Continued from Page 66)

Very careful attention has been given to the weight, balance and construction of the "Petco" Bow Pencil. All instruments have satin finish.

For further information on the "Petco" oversize Bow Pencil, write Peters Company, 305 West Congress St., Detroit, Mich.

Yohe 5-Arm Rack

(Continued from Page 65)

stands only 57" high, has arm capacity about 10" diameter, with opening over hooks 4¼". All Yohe racks can be placed against a wall or in any position in the shop, either singly or with backs overlapping. This flexibility permits the Yohe racks to store every type of bar or tube stock most conveniently.

A new circular, "Handiest Rack in the Shop," gives details and prices. Write Wm. S. Yohe Supply Co., 507 Gibbs Ave., N.E., Canton, O.

Need Additional Facilities? Consult the Contract Shop Directory — Page 44.

At Bench or Machine

WOVEN RUBBER MATTING

Reduces Damage and Breakage
Lessens Fatigue
Assures Firm Footing
Prevents Tracking

Stock sizes or Custom made.

Write for free sample and estimate giving dimension of space to be covered.

WOLVERINE MAT COMPANY

5301 Grand River Ave. Detroit, Mich.

IS the pressure of today's emergency situation overwhelming you with new engineering problems?

Are you handicapped in solving these problems by the difficulty in obtaining capable engineering talent?

Answers to these, and all other questions involving changes in production routine caused by the new conditions, are found here in the widely diversified experience of our skilled engineers.

Draw on this experience. This experience, supplemented by a thorough knowledge of war requirements, is just what you need at this time.

PIONEER ENGINEERING
AND MANUFACTURING CO.
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COLONIAL
BUSHINGS

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Bumpers — Bushings — Rolls — Extrusions — Gaskets — Grommets — Washers — Rings — Sheet — Slab — Spring — Sponge — Molded Tires — Tubing — Vacuum Cups, Etc.

For Prompt Shipment From Stock.

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DESIGNERS — ENGINEERS — MANUFACTURERS OF MOLDED RUBBER PRODUCTS

Our designers and engineers are at your service to solve your special rubber problems in perfecting new machines. Write for Catalog 21P.

ALL PHONES: HAYMARKET 7093

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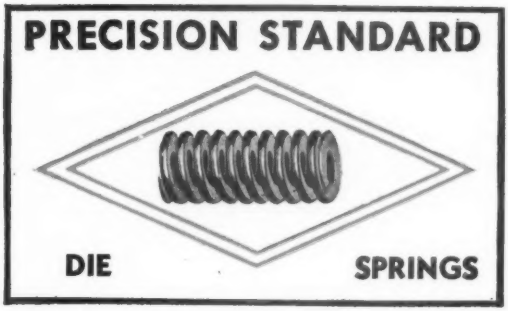
are Packed in Cartons with this Label



For many years *Precision-Standard* ◄PS► *Die Springs* have been designed and manufactured to meet the most exacting requirements of die, tool, jig and fixture builders.

Precision-Standard Die Springs have continuously assured stamping and forging manufacturers and all die users of longer spring fatigue life and trouble-free die operation.

They have been approved and adopted as standard by leading automotive manufacturers.

All *Precision-Standard Die Springs* are now available in cartons to enable you to select sizes quickly and to maintain stocks complete and orderly.

Standardize on ◄PS► Die Springs

Send for complete Catalog

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Coiled and Flat Springs for Every Purpose

MARVEL Saws

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